Office of Environmental Health Hazard Assessment
California Environmental Protection Agency

HEALTH EFFECTS OF DIESEL EXHAUST
FACT SHEET
August 2000

Background

In 1998, the California Environmental Protection Agency's Office of Environmental Health Hazard Assessment (OEHHA) completed a comprehensive evaluation of the potential human health effects from exposure to diesel exhaust. The OEHHA report and the recommendations of the Scientific Review Panel formed the scientific basis for the decision by the Air Resources Board (ARB) in August 1998 to identify particulate emissions from diesel-fueled engines as a Toxic Air Contaminant. This fact sheet summarizes the findings of OEHHA's evaluation and health risk assessment of diesel exhaust.

What is Diesel Exhaust?

- Diesel exhaust is a complex mixture of gases and fine particles formed by the combustion of diesel fuel. Many known and potential cancer-causing substances such as arsenic, benzene, formaldehyde, nickel, and polycyclic aromatic hydrocarbons are present in the exhaust gases, some of which are bound to the surfaces of the diesel-exhaust particles.
- Diesel exhaust contains more than 40 substances that ARB has identified as Toxic Air Contaminants.
- Diesel exhaust particles are small enough (less than 10 microns in diameter, about one-seventh of the width of a human hair) to be inhaled deep into the lungs, where they can affect lung performance and cause damage over time.

What are the Health Effects of Diesel Exhaust?

- Short-term exposure to diesel exhaust can irritate the eye, nose and throat, cause respiratory symptoms such as increased cough, labored breathing, chest tightness and wheezing, and cause inflammatory responses in the airways and the lung. Exposure to diesel exhaust may also cause increased allergic responses to allergens such as ragweed pollen.
- Longer-term exposure to diesel exhaust can cause chronic respiratory symptoms and reduced lung function, and may cause or worsen allergic respiratory diseases such as asthma.
- There is not enough information to determine if diesel exhaust exposure causes reproductive or developmental effects in humans. Reproductive and developmental effects have been seen in exposed laboratory animals.
- Workers exposed to diesel exhaust have been shown to have an increased risk of developing lung cancer. Exposure to diesel exhaust has caused lung cancer in laboratory animals.
- Exposure to "whole" diesel exhaust (diesel gases and particles) can cause the above-mentioned health effects, while exposure to diesel particles alone has been linked in animal studies with lung cancer and allergic reactions.

- Recent epidemiological studies of the health effects of diesel exhaust have corroborated the findings in earlier studies of elevated rates of lung cancer in exposed workers and the allergy-causing potential of diesel exhaust particles.

What Health Risks Do Californians Face From Exposure to Diesel Exhaust?

ARB estimates that Californians are exposed (indoors and outdoors) to an average of 1.3 micrograms of diesel exhaust particulate per cubic meter of air. What kind of health risk could this pose?

- After analyzing more than 30 studies of workers exposed to diesel exhaust, OEHHA estimated that 130 to 2,400 "excess" cancer cases would be expected to occur in a population of 1 million people breathing 1 microgram of diesel particles per cubic meter of air over a 70-year lifetime. (In other words, there could be 130 to 2,400 additional cancer cases beyond what would be expected to occur if there were no diesel particles in the air.) An independent review by ARB's Scientific Review Panel derived an estimate of cancer risk within that range of 300 excess cancer cases per million people breathing 1 microgram of diesel particles per cubic meter of air over a lifetime.
- Using this "best estimate" of 300 excess cancer cases per million, and multiplying that by ARB's estimate of Californians' average exposure of 1.3 micrograms of diesel particles per cubic meter of air, the excess cancer risk in California from diesel particles would be 390 cases per million. This is higher than any other identified Toxic Air Contaminant. Risks to people exposed to higher-than-average levels of diesel particles (such as people who work around diesel equipment) could be significantly higher than 390 per million.
- According to OEHHA, scientific evidence suggests that noncancer lung damage (such as reduced lung function and increased sensitivity to asthma) can occur when long-term ambient diesel particle levels are greater than 5 micrograms per cubic meter. Although this is higher than the average concentration of diesel particles in California's air, people can be exposed to diesel-particle concentrations greater than 5 micrograms per cubic meter near truck stops, busy freeways, and other places where multiple diesel engines are in operation.

What Have Health Agencies Concluded About Diesel Exhaust?

- The International Agency for Research on Cancer concluded in 1989 that diesel engine exhaust "is probably carcinogenic to humans."
- In 1990, the State of California administratively listed diesel exhaust under Proposition 65 as a chemical known to the State to cause cancer.
- The National Toxicology Program in 2000 listed diesel particles as being "reasonably anticipated to be a human carcinogen."